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Pesticide Fact Sheet Number 163: Lactic Acid

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15. Supplementary Notes

16. Abstract (Limit: 200 words)

This document contains up-to-date chemical information, including a summary of the Agency's regulatory position and rationale, on a specific pesticide or group of pesticides. A Fact Sheet is issued after one of the the following actions has occurred.

1. Issuance or reissuance of a registration standard,
2. Issuance of each special review document,
3. Registration of a significantly changed use pattern,
4. Registration of a new chemical, or
5. An immediate need for information to resolve controversial issues relating to a specific chemical or use pattern.

17. Document Analysis a. Descriptors

Pesticides, regulations, Chemical Information Fact Sheet, Use Patterns, science findings.

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

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EPA Pesticide Fact Sheet

Name of Chemical: LACTIC ACID
Reason for Issuance: NEW CHEMICAL REGISTRATION
Date Issued: APR 29 1988
Fact Sheet Number: 163

1. Description of Chemical

Common Name: Lactic acid

Chemical Name: 2-Hydroxypropanoic acid

Trade Names: Propel, SY-83

OPP (Shaughnessy) Number: 128929

Chemical Abstracts Service (CAS) Number: 79-33-4

Empirical Formula: $C_3H_6O_3$

Molecular Weight: 90.08

Year of Initial Registration: 1988

Pesticide Type: Plant growth regulator

U.S. Producer: Purac Inc.

2. Use Patterns and Formulations

Types of Effects: Lactic acid hastens ripening, increases fruit, seed and pod set and increases shoot and root initiation.

Application Sites: Almonds, apples, beans (green and dry), broccoli, cabbage, cauliflower, cherries, citrus, corn (sweet and field), cotton, grapes, lettuce, peppers (green and chile), pineapples, prunes, strawberries, sugarcane, tomatoes and walnuts.

Types and Methods of Application: Applied by conventional aerial or ground equipment to foliage.

Application Rates: Rates range from 1 to 4 pounds active ingredient (ai)/acre. A 1000-2000 parts per million (ppm) solution will be used for pineapple and sugarcane planting materials.

Type of Formulation: 80% ai solution

Usual Carriers: Water

3. Science Findings

Summary Science Statement: Available acute toxicity data indicate Toxicity Category I for lactic acid, based on pH. Lactic acid is a severe dermal and eye irritant. However, acute dermal data indicate no systemic toxicity. Protective clothing and eye protection statements are required on the label to minimize exposure during mixing, loading and application operations. Subchronic/chronic toxicity, mutagenicity and environmental fate data requirements are waived. The use of lactic acid is not expected to cause adverse effects to nontarget organisms including endangered species. The chemical is exempted from the requirement of a tolerance when used as a plant growth regulator in or on all raw agricultural commodities (RAC).

Chemical Characteristics

Physical State: Nonvolatile liquid

Color: Colorless

Odor: Odorless to weakly acid

Boiling Point: 190 C (760 mm Hg)

Density: 1.195 (at 85.3% purity) grams/ml

Solubility (25 C): Water - infinite
Ether - infinite
Ethanol - infinite

Vapor Pressure: 1.3 mm Hg at 90 C

Dissociation Constant: pKa = 3.87

pH: 0.6

Stability: Material is stable at normal temperatures.

Toxicological Characteristics:

Acute toxicity results

Acute oral toxicity (rat): 4,936 mg/kg (male), 3,543 mg/kg (female), Toxicity Category III

Acute dermal toxicity (rabbit): greater than 2,000 mg/kg, Toxicity Category III

Acute inhalation toxicity (rat): greater than 5.0 mg/l (analytical concentration) and 7.94 mg/l (nominal concentration) for each sex separately or combined. Toxicity Category III

Primary dermal irritation (rabbit): Lactic acid is a severe dermal irritant. Toxicity Category I

Primary eye irritation: This data requirement was not required since the pH of the chemical is less than 2. Toxicity Category I is assigned because of the low pH.

Dermal sensitization (guinea pig): Lactic acid is not a dermal sensitizer.

Subchronic, chronic toxicity and mutagenicity data requirements are waived. These waivers are based on the following, (1) the natural occurrence of lactic acid; (2) residues resulting from the registered uses will not be higher than is presently allowed in food production and (3) such residues will not exceed normal physiological lactic acid levels in raw agricultural commodities (RACs).

Major Routes of Exposure: Mixers, loaders and applicators would receive the most exposure via skin/eye contact and inhalation.

Physiological and Biochemical Behavioral Characteristics:

Mechanism of pesticidal action: Preliminary research indicates that lactic acid causes temporary stimulation of the Krebs cycle after glycolysis.

Metabolism and persistence in plants and animals: Lactic acid is a normally occurring compound in both plants and animals. It is formed and metabolized from/to pyruvic acid in glycolysis.

Environmental Characteristics:

Lactic acid is naturally occurring and is rapidly formed and degraded in soil. The chemical is found in root exudates of common vegetables. It is a product of aerobic and anaerobic soil metabolism of glucose and plant matter. Because of the volume of data available on this compound and its natural occurrence in the environment, the environmental fate data requirements are waived.

Ecological Characteristics:

Avian acute oral toxicity (bobwhite quail): greater than 2,250 mg/kg

Avian dietary toxicity (bobwhite quail): greater than 5,620 ppm

Avian dietary toxicity (mallard duck): greater than 5,620 ppm

Fish acute toxicity (bluegill): 130 ppm

Fish acute toxicity (rainbow trout): 130 ppm

Aquatic invertebrate toxicity (Daphnia magna): 750 ppm

Potential problems related to endangered species: Minimal hazard to endangered species is expected from the proposed use of lactic acid due to the chemical's natural occurrence in the environment and living organisms and its low toxicity.

Tolerance Assessment: Lactic acid (2-Hydroxypropanoic acid) is exempted from the requirement of a tolerance when used as a plant growth regulator in or on all raw agricultural commodities (RAC). Lactic acid is approved for use as an inert ingredient for application to plants (40 CFR 180.1001 (c)). The Food and Drug Administration approved the use of lactic acid as a generally recognized as safe (GRAS) ingredient in human foods. No Mexican or Canadian tolerances or Codex Alimentarius maximum residue limits have been established for residues of lactic acid in any RAC.

4. Summary of Regulatory Positions

The following Agency positions are summarized from the Lactic Acid Registration Standard.

None of the risk criteria listed in 40 CFR 154.7 for initiating a Special Review has been exceeded.

The Agency is requiring protective clothing and eye protection.

The Agency has waived the subchronic, chronic and mutagenicity data requirements.

The Agency has waived environmental fate data requirements for lactic acid.

Use, Formulation or Geographic Restrictions: None

Unique Label Warning Statements: Protective clothing and eye protection are required.

5. Summary of Major Data Gaps

None

6. Contact Person at EPA

Robert J. Taylor
U.S. Environmental Protection Agency
Registration Division (TS-767C)
401 M Street., S.W.
Washington, D.C. 20460
(703) 557-1800

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